

CLAIMS

1. A high frequency atomising device for atomising a coating fluid and for the subsequent coating of a substrate (14), with

- an atomising unit (1) that can be excited to generate high frequency vibrations, which unit atomises the coating fluid fed to it to form a spray mist,
- a positionable substrate holder (8, 9) which retains the substrate (14) to be coated constantly in a position favourable for coating inside the spray mist, as a result of which the substrate (14) is wetted with the spray mist, and
- at least one drying device (6) which dries the spray mist coat formed on the substrate (14).

2. The device according to Claim 1, characterised in that the atomising unit (1) can be moved relative to the substrate (14).

3. The device according to Claim 1 or 2, characterised in that the high frequency atomising device comprises a storage tank (5) for storing the coating fluid.

4. The device according to any one of Claims 1 to 3, characterised in that the high frequency atomising device comprises a first temperature setting device (23, 25), wherein the first temperature setting device (23, 25) is designed to adapt a temperature of the coating fluid.

5. The device according to Claim 4, characterised in that the first temperature setting device (23) is arranged in the storage tank (5).

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6. The device according to Claim 4, characterised in that the first temperature setting device (25) is formed on the atomising unit (1).

7. The device according to any one of Claims 1 to 6, characterised in that the high frequency atomising device comprises at least one device (29) for generating an electrical field, wherein the device for generating an electrical field is designed to generate an electrical field between the atomising unit (1) and at least one part of the substrate holder (9).

8. The device according to any one of Claims 1 to 7, characterised in that the high frequency atomising device comprises at least one device (30) for generating a magnetic field, wherein the device for generating a magnetic field is designed to generate a magnetic field between the atomising unit (1) and at least one part of the substrate holder (9).

9. The device according to any one of Claims 1 to 8, characterised in that the atomising unit (1) comprises a resonance body (2) that widens into the shape of a trumpet, and preferably has a ultrasonic atomiser.

10. The device according to Claim 9, characterised in that the resonance body has a capillary tube (17) with an expanding horn (18) connecting to it in the longitudinal direction.

11. The device according to Claim 10, characterised in that the horn (18) expands according to one of the functions from the group consisting of tractrix function, exponential function, minimum tuning curve and clotoid function.

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12. The device according to Claim 10 or 11, characterised in that the horn (18) opens at its outer opening in a perforated disc (22) with a single hole.

13. The device according to Claim 12, characterised in that the perforated disc (22) is circular.

14. The device according to Claim 12 or 13, characterised in that the perforated disc (22) is loaded with coating fluid via the tube (17) and the horn (18) by means of a controllable pulsation-free proportioning pump (4).

15. The device according to Claim 10, characterised in that the diameter of the tube (17) is between 0.01 mm and 15 mm.

16. The device according to Claim 10, characterised in that the diameter of the tube (17) is between 0.3 mm and 0.5 mm.

17. The device according to Claim 12 or 13, characterised in that the diameter of the perforated disc (22) is between 1 and 100 mm.

18. The device according to Claim 12 or 13, characterised in that the diameter of the perforated disc (22) is between 3 and 30 mm.

19. The device according to Claim 12 or 13, characterised in that the diameter of the perforated disc (22) is approximately 8 mm.

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20. The device according to any one of the preceding claims, characterised in that the atomising unit (1) is enclosed by a housing (16) that is open on one side, wherein the resonance body (2) is arranged in the region of the housing opening.

21. The device according to Claim 20, characterised in that the housing (16) has a controllable air or gas supply (31).

22. The device according to Claim 21, characterised in that the air or gas supply (31) is designed as an inert gas supply (31) for feeding inert gas to the housing.

23. The device according to Claim 22, characterised in that the high frequency atomising device comprises a second temperature setting device (24), wherein the second temperature setting device (24) is designed to adapt a temperature of the inert gas.

24. The device according to Claim 23, characterised in that the second temperature setting device (24) is formed on and/or in the inert gas supply (31).

25. The device according to any one of Claims 20 to 24, characterised in that one of the openings of the housing (16) has an inert gas nozzle (3) through which the inert gas supplied through the inert gas supply (31) escapes as a carrier medium for spray jet conditioning of the spray mist.

26. The device according to Claim 25, characterised in that the inert gas nozzle (3) can be set in order to vary the dispersal of the spray mist jet within the range of 0° to 180°.

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27. The device according to any one of the preceding claims, characterised in that the substrate (14) to be coated can be positioned by means of the positionable substrate holder (8, 9) inside the spray jet.

28. The device according to Claim 27, characterised in that the substrate holder (8, 9) is suitable for imparting to the substrate (14) six different degrees of freedom of movement.

29. The device according to any one of the preceding claims, characterised in that the drying device (6) comprises a heat source, preferably a heating system which is enclosed by a heating housing (20) open on one side, wherein the heating housing (20) has a controllable inert gas supply for generating a hot air flow.

30. The device according to any one of Claims 1 to 28, characterised in that the drying device (6) comprise an infrared heat source.

31. The device according to any one of the preceding claims, characterised in that the high frequency atomising device also has a controllable suction device (10) for sucking off the overspray and for further spray jet conditioning.

32. The device according to any one of the preceding claims, characterised in that the drying device (6), the substrate holder (8), the suction device (10) for sucking off the overspray, the atomising unit (1) and the inert gas supply for spray jet conditioning and for hot air flow generation for achieving an optimum coating result, are controlled by a programmable control unit.

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33. The device according to any one of the preceding claims, characterised in that at least the atomising unit (1), the positionable substrate holder (8, 9) and the suction device (10) are surrounded by a housing (11).

34. The device according to Claim 33, characterised in that the drying device (6) is also surrounded by the housing (11).

35. The device according to Claim 33 or 34, characterised in that the housing (11) forms a coating chamber (32), wherein the high frequency atomising device comprises a third temperature setting device (26), and wherein the third temperature setting device (26) is designed to adapt a temperature of the coating chamber (32).

36. The device according to Claim 35, characterised in that the high frequency atomising device comprises a process temperature control device (27), wherein the process temperature control device (27) controls one of the first (23, 25) to third (26) temperature setting device so that conditions that can be predetermined for a coating process prevail.

37. An application of a high frequency atomising device according to any one of the preceding claims for single or multiple coating of substrates with a homogeneous coating 1 nm to 1 mm thick.